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Supplementary Materials for

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Supplementary materials

1. Measurement Invariance

A longitudinal configural model was estimated with the same indicators loading on the latent factor at each wave. Factor covariances were freely estimated across waves, and correlated residuals were allowed for repeated indicators across adjacent waves, along with a small number of additional residual covariances. This model demonstrated acceptable fit, $\chi^2(236) = 409.13$, $p < .001$, CFI = .924, RMSEA = .029, SRMR = .090, supporting a consistent factor structure across time. Full metric invariance was tested by constraining factor loadings to equality across the five waves. The metric model also demonstrated acceptable fit, $\chi^2(252) = 443.16$, $p < .001$, CFI = .916, RMSEA = .029, SRMR = .101. Although the chi-square difference test indicated a statistically significant decrease in fit relative to the configural model, $\Delta\chi^2_{SB}(16) = 34.04$, $p = .005$, changes in approximate fit indices remained within commonly recommended thresholds (ΔCFI = .008; ΔRMSEA = .000), supporting metric invariance across time (Putnick & Bornstein, 2017).

2. Drop out analyses

To examine whether attrition from T1 to T5 ($N = 233$) was systematically related to background characteristics or study variables, logistic regression analyses were conducted predicting retention (0 = dropout, 1 = retained) from gender, perceived financial situation, immigrant background, and T1 levels of radicalism and political alienation. The results indicated that attrition was largely unrelated to the study variables and background characteristics. Two variables showed significant associations: political trust and perceived financial situation. Adolescents with lower levels of political trust were less likely to remain in the study ($B = -0.41$, $p = .001$), whereas those reporting better perceived financial situations were more likely to be retained ($B = 0.25$, $p = .016$). However, the overall

explanatory power of the model was low (Nagelkerke $R^2 = .067$), suggesting that these effects are small and unlikely to substantially bias the main analyses (Borooah, 2001). Overall, the results indicate no major systematic differences between participants who remained in the study and those who dropped out. Inspection of missing data patterns showed that the average proportion of missing data across study variables was 21%. Little's MCAR test was significant ($\chi^2 = 3322.13$, df = 2235, $p < .001$), indicating that the data were not missing completely at random. Although the missing at random cannot be tested directly, the attrition analyses suggest that missingness was only weakly related to observed variables. Accordingly, Full Information Maximum Likelihood (FIML) estimation was used, which provides unbiased parameter estimates under the MAR assumption and is generally preferred over traditional methods such as listwise deletion or mean imputation (Little & Rubin, 2002).

3. Lagged effects at the within-person level (RI-CLPM).

To test the possibility of lagged effects and the direction of these effects at the within-person level, Random-Intercept Cross-Lagged Panel Model was estimated (Hamaker, et al., 2015). Following the procedures described by Hamaker and colleagues, each observed score was regressed on its own latent factor (each loading constrained at 1). The stability paths, cross-lagged effects, correlated residuals at T2-T5, as well as within-time correlations at T1 were specified between these latent constructs. Two overarching random intercept factors were added to capture the trait-like differences between persons in radicalism and distrust/ dissatisfaction/ powerlessness. The observed scores were the indicators of these factors, and all factor loadings were constrained at 1. The measurement error variances of the observed scores were constrained to zero. Thus, all variation in the observed measures was completely captured by within-person and between-person latent factor structure

Political distrust. The fit of the initial, the model was good, $\chi 2$ (21) = 36.18, p = .070, RMSEA = .029, SRMR = .034. Constraining all stability paths of radicalism (except of T4-T5) and disstrust, all within-time correlations between the two, the cross-lagged paths from disstrust to radicalism, and the cross-lagged paths from radicalism to disstrust did not significantly worsen model fit: $\chi 2$ (36) = 56.94, p = .015, RMSEA = .026, SRMR = .040 (i.e., $\Delta\chi^2(15) = 20.76$, p = .145). At the between-person level, there was a significant correlation between alienation and radicalism r = .35, p = .001). This shows that adolescents who reported higher levels of alienation across five time points reported more radicalism across five years. After controlling for these stable, trait-like differences, some evidence was found for small within-person associations. There was a significant witin-time association (r = .02, p = .047) and correlated changes between alienation and radicalism at T1 (r = .02, p = .047; r = .05, p = .045, and r = .06, p = .044 at T2-T4 respectively), indicating that a within-person changes in alienation were linked to within-person changes in radicalism. No significant lagged effects were found.

Political powerlessness. The fit of the initial, the model was good, $\chi 2$ (21) = 20.87, p = .460, RMSEA = .001, SRMR = .024. Constraining all stability paths of radicalism (except of T4-T5) and powelessness (except of T1-T2), all within-time correlations between the two, the cross-lagged paths from powerlessness to radicalism and the cross-lagged paths from radicalism to powerlessness did not significantly worsen model fit: $\chi 2$ (25) = 37.92, p = .337, RMSEA = .010, SRMR = .035 (i.e., $\Delta\chi^2(14) = 17.06$, p = .252). At the between-person level, there was a significant correlation between powerlessness and radicalism (r = .16, p = .047). This indicates that adolescents who reported higher powerlessness across five time points reported more radicalism across five years. After controlling for these stable, trait-like differences, some evidence was found for small within-person associations. There was a bordeline significant within-time association at T1 (r = .02, p = .056) and bordeline

significant correlated changes between powerlessness and radicalism (r = .03, p = .055; r = .05, p = .054, r = .06, p = .055, and r = .05, p = .054, at T2-T5 respectively), indicating that a within-person changes in powerlessness were weakly linked to within-person changes in radicalism. No significant lagged effects were found.

Political dissatisfaction. The fit of the initial, the model was good, $\chi 2$ (21) = 47.31, p = .001, RMSEA = .038, SRMR = .038. Constraining all stability paths of radicalism (except of T4-T5) and satisfaction (except of T1-T2), all within-time correlations between the two, the cross-lagged paths from dissatisfaction to radicalism (except of T3-T4), and the cross-lagged paths from radicalism to dissatisfaction did not significantly worsen model fit: χ^2 (34) = 62.93, p = .002, RMSEA = .031, SRMR = .045 (i.e., $\Delta\chi^2(13) = 15.62$, p = .270). At the between-person level, there was a significant correlation between dissatisfaction and radicalism (r = .15, p = .051). This indicates that adolescents who reported higher levels of dissatisfaction across five time points reported more radicalism across five years. After controlling for these stable, trait-like differences, some evidence was found for small within-person associations. There was a significant within-time association at T1 (r = .07, p = .001) and correlated changes between dissatisfaction and radicalism (r = .07, p = .001; r = .13, p = .001, r = .17, p = .001, and r = .13, p = .001, at T2-T5 respectively), indicating that a within-person changes in dissatisfaction were linked to within-person changes in radicalism. There was also evidence for significant lagged effects from dissatisfaction to radicalism from T3 to T4 (B = .27, p = .001) and from radicalism to dissatisfaction from T1 to T2, from T2 to T3, from T3 to T4, and from T4 to T5 (B = .11, p = .002; B = .09, p = .002; B = .05, p = .003; B = .03, p = .003).

4. Sensitivity analyses

4.1. Dichotomized measure of radical behavior.

As a robustness check, we estimated a series of binary logistic regressions using a dichotomized measure of radical behavior (0 = no behavior, 1 = any behavior) across all five waves. At T1, political dissatisfaction (OR = 1.51, $p = .009$) and distrust (OR = 1.58, $p = .001$) were significantly associated with radical behavior, whereas powerlessness was not ($p = .241$). At T2, dissatisfaction (OR = 2.05, $p < .001$) and distrust (OR = 1.63, $p = .021$) were significant predictors, while political powerlessness showed a marginal effect (OR = 1.71, $p = .051$). At T3, all predictors were significant, including distrust (OR = 1.92, $p = .001$), dissatisfaction (OR = 2.14, $p < .001$), and powerlessness (OR = 2.29, $p = .006$). At T4, there were significant associations for dissatisfaction (OR = 2.55, $p < .001$), distrust (OR = 3.12, p < .001), and powerlessness (OR = 1.90, $p = .025$). At T5, dissatisfaction (OR = 2.40, p < .001) and distrust (OR = 2.71, $p < .001$) remained significant, whereas powerlessness showed a positive but marginal association (OR = 1.83, $p = .061$). As a robustness check, we estimated a series of binary logistic regressions using a dichotomized measure of radical behavior (0 = no behavior, 1 = any behavior) across all five waves. At T1, political dissatisfaction (OR = 1.51, $p = .009$) and distrust (OR = 1.58, $p = .001$) were significantly associated with radical behavior, whereas overall alienation was not ($p = .241$). At T2, dissatisfaction (OR = 2.05, $p < .001$), distrust (OR = 1.63, $p = .021$), and alienation (OR = 2.34, $p = .003$) were significant predictors, while powerlessness showed a marginal effect (OR = 1.71, $p = .051$). At T3, all predictors were significant, including distrust (OR = 1.92, $p = .001$), dissatisfaction (OR = 2.14, $p < .001$), and alienation (OR = 2.29, $p = .006$). At T4, effect sizes were largest, with strong associations for dissatisfaction (OR = 2.55, $p < .001$), distrust (OR = 3.12, $p < .001$), and alienation (OR = 1.90, $p = .025$). At T5, dissatisfaction (OR = 2.40, $p < .001$) and distrust (OR = 2.71, $p < .001$) remained significant, whereas alienation showed a positive but marginal association (OR = 1.83, $p = .061$). Overall, these findings indicate that political alienation - particularly dissatisfaction and distrust - is

consistently associated with a higher likelihood of radical behavior, with effects strengthening from T1 to T4 and remaining substantial at T5, although overall explanatory power was modest (Nagelkerke R^2 = .01-.10).

4.2. Alternative operationalizations of immigrant background

ANOVA. Similarly to the main results for political alienation obtained for non-Nordic immigrant youth, non-Swedish immigrant youth showed significantly higher distrust at T2 and T5 (F (1, 737) = 5.72, p = .017 and F (1, 621) = 7.80, p = .005) and higher powerlessness at T1 (F (1, 798) = 4.059, p = .044), compared to youth without non-Nordic immigrant background. Non-European immigrant youth showed significantly higher distrust only at T5 (F (1, 617) = 6.35, p = .012) and powerlessness at T4 (F(1, 630) = 3.91, p = .048), compared to youth without non-European immigrant background. Regarding radicalism, similarly to the main results for non-Nordic immigrant youth, non-Swedish immigrant youth showed higher levels of radicalism at T1 and T2 (F(1, 820) = 10.06, p = .002 and F(1, 735) = 14.71, p = .001) compared to youth without non-Swedish immigrant background, while non-European immigrant youth showed higher level of radicalism only at T2 (F(1, 730) = 14.24, p = .001) compared to youth without non-European immigrant background.

The moderation of the main effects. Similarly to the moderation results of the main effects of political alienation on radicalism obtained for a non-Nordic immigrant youth, the moderation of distrust was not significant for a non-Swedish immigrant youth (Δ-2LL = 0.54 (1), p = .05; ΔAIC = 1.54) or for a non-European immigrant youth (Δ-2LL = 2.02 (1), p = .155; ΔAIC = 0.02). The moderation of powerlessness was also not significant for a non-Swedish immigrant youth (-2LL = 0.00 (1), p = 1.000; ΔAIC = 2.00) or for a non-European immigrant youth (Δ-2LL = 0.57 (1), p = .045; ΔAIC = 1.43; the interaction term: B = -0.034, p = .456, 95% CI [-0.108, 0.041]). The moderation of dissatisfaction was not significant for

non-Swedish immigrant youth (Δ-2LL = 2.15 (1), p = .143; ΔAIC = 0.15). However, the moderation of dissatisfaction was significant for non-European immigrant youth (Δ-2LL = 7.22 (1), p = .007; ΔAIC = 5.22), showing that the effect of dissatisfaction on radicalism was *weaker* among non-European immigrant youth (B = -0.079, p = .007, 95% CI [-0.127, -0.030]).